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SENATE

{ REPORT
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NATIONAL EARTHQUAKE HAZARDS
REDUCTION PROGRAM
REAUTHORIZATION ACT

Mr. HOLLINGS, from the Committee on Commerce, Science,
and Transportation, submitted the following

REPORT

OF THE

SENATE COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION

ON

S. 2789



AUGUST 30, 1990.—Ordered to be printed

Filed under authority of the order of the Senate of August 2 (legislative
day, July 10), 1990

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NATIONAL EARTHQUAKE HAZARDS REDUCTION
PROGRAM REAUTHORIZATION ACT

AUGUST 30, 1990.—Ordered to be printedFiled under authority of the order of the Senate of August 2 (legislative day,
July 10), 1990

Mr. HOLLINGS, from the Committee on Commerce, Science, and
Transportation, submitted the following

REPORT

[To accompany S. 2789]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 2789) to authorize appropriations for the Earthquake Hazards Reduction Act of 1977, and for other purposes, having considered the same, reports favorably thereon with amendments and recommends that the bill as amended do pass.

PURPOSE OF THE BILL

The bill authorizes the National Earthquake Hazards Reduction Program (NEHRP) for fiscal years (FY) 1991 and 1992. It also revises, updates, and reorganizes the original Earthquake Hazards Reduction Act of 1977 ("the Earthquake Act") and, in particular, clarifies the roles of the agencies in the NEHRP, in order to strengthen, broaden, and improve the effectiveness of the NEHRP.

BACKGROUND AND NEEDS

Earthquakes are among the most devastating of all natural hazards. As illustrated by the 1988 earthquake in Armenia, in a few minutes a single earthquake can kill tens of thousands of people without warning. In the United States, earthquakes pose a large threat to California, Alaska, Hawaii, Oregon, Washington, Nevada, and other parts of the Western United States. In 1906, an earthquake with a magnitude 8 on the Richter scale killed over 700

people and destroyed much of San Francisco. A similar earthquake today would cause 3,000 to 11,000 deaths, cause many thousands of serious injuries, and result in tens of billions of dollars in property damage and other economic loss. Even the October 1989 Loma Prieta earthquake in the San Francisco Bay area, which was at least 30 times less powerful than the 1906 quake and, fortunately, was centered in a sparsely populated area well south of San Francisco, killed 62 people and caused over \$8 billion in damage. Recent evidence has shown that the risk of a catastrophic earthquake in the Pacific Northwest, which is much less well-prepared than California, is extremely high.

However, damaging earthquakes are not restricted to the Western United States. Recent research indicates that in the last 250 years the central and eastern United States have experienced several earthquakes as large as or larger than the Armenian earthquake, and that such earthquakes will occur in the future. In the 1700s and 1800s, major earthquakes struck the Boston area, the New York City area, Charleston, SC, and the lower Mississippi Valley. Several times in the last two years, the Committee has heard earthquake experts testify that the probability of a destructive earthquake in the eastern and central United States before the year 2010 is at least 50 percent and may be nearly 100 percent.

HISTORY OF THE NEHRP

To address this national problem, the Committee played a major role in the enactment of the Earthquake Act, the statute that created the NEHRP. The purpose of the Earthquake Act is to coordinate earthquake research and to improve earthquake preparedness. Four principal agencies are involved in the NEHRP—the Federal Emergency Management Agency (FEMA), the U.S. Geological Survey (USGS), the National Science Foundation (NSF), and the National Institute of Standards and Technology (NIST). FEMA is responsible for helping the States to prepare for and respond to major earthquakes. USGS, as the Nation's principal geological agency, assesses seismic risks throughout the country, assists State and local officials in identifying the most dangerous areas, and monitors and investigates earthquakes. NSF, as part of its mission to support basic scientific and engineering research in universities, supports academic investigators in both geology and earthquake engineering. NIST's Center for Building Technology investigates the properties and behavior of construction materials, including their resistance to seismic activity.

When the NEHRP was created, the White House Office of Science and Technology Policy (OSTP) was given responsibility for coordinating the program. In 1980, Congress assigned that job to the newly-created FEMA. According to the Earthquake Act, FEMA is to recommend to the President roles and responsibilities of the appropriate Federal agencies, compile and maintain a program plan for the NEHRP, report to Congress on NEHRP activities, and develop an overall strategy for the program.

In addition to the four principal agencies, several other agencies, including the Departments of Defense (DOD), Commerce, and Energy, the National Aeronautics and Space Administration, and

the Nuclear Regulatory Commission, participate in NEHRP activities, especially those regarding seismic safety in construction.

Although the Committee reauthorizes the entire NEHRP in one bill which covers all four agencies, funding for each agency's part of the program is appropriated individually as part of that agency's appropriations. The authorizations under NEHRP for NSF and NIST duplicate authorizations provided for those agencies in other legislation. In contrast, the Earthquake Act provides the sole authorization for earthquake activities at the USGS and FEMA. In 1988, a bill reported by the Committee reauthorized the program for three years through FY 1990 (Public Law 100-252). For fiscal year 1991, the Administration has requested \$73.7 million for the NEHRP.

CONCERNS ABOUT THE PROGRAM

The Committee has strongly supported the NEHRP and, in fact, in that last authorization bill (Public Law 100-252), approved a 16 percent increase in funding from FY 1988 to FY 1990. The NEHRP has made major strides, particularly in research related to building safety and the identification of those areas of the United States most prone to seismic damage.

However, in recent years, concerns have grown within the earthquake community about five problems with the NEHRP: (1) the continuing erosion of appropriations levels (in real dollars) for the program; (2) the slow and, in the view of many experts, inadequate application of research findings to earthquake preparedness; (3) the need to improve coordination of the agencies in the program and define better their roles; (4) the need to update and broaden the scope of the Earthquake Act; and (5) the need to ensure the seismic safety of Federal buildings. These problems and their consequences are discussed in detail in a very complete review of the NEHRP prepared for FEMA, entitled "Commentary and Recommendations of the Expert Review Committee, 1987."

Funding levels

Since the NEHRP was established in the late 1970s, funding for its activities has shrunk about 35 percent in real dollars (see "The National Earthquake Hazards Reduction Program," a Congressional Research Service Report to Congress, August 9, 1989). Much valuable research has been done despite the reduced funding, but the reductions have taken a toll. Regional seismic networks which provide important information on earthquakes in the central and eastern States have faced major cutbacks. Earthquake engineering programs to develop safer buildings and structures have been scaled back, and existing research facilities have been underutilized. The number of research grants for earthquake scientists and engineers has been cut, and some excellent researchers have left the field.

The shrinking NEHRP budget also has forced cutbacks in programs to help the public to prepare for earthquakes, just when new research is revealing that more people are vulnerable to the threat of earthquakes than previously thought, especially in the eastern and central United States and in the Pacific Northwest. FEMA has ongoing efforts to help communities prepare disaster plans in case

of an earthquake, but little money has been available to fund efforts to improve building codes and zoning provisions so that buildings will be safe in an earthquake. The safety of school buildings and hospitals remains a prime concern.

These funding problems have led to calls for both a more effective, coordinated use of existing NEHRP funds and the development of a more effective strategy for future program activities.

Application of research

Concern also has grown that much of the scientific and engineering research that has been done under the NEHRP has not been applied effectively. Structural engineers and builders often do not know about the latest research that the NEHRP has funded; data that would help insurance estimators and developers better understand earthquake hazards is not always available in usable forms; and local zoning commissions often are not informed on the latest research findings about active faults and liquefaction zones in their areas.

New efforts to improve applications are being made through NEHRP-assisted organizations such as the National Center for Earthquake Engineering Research (NCEER) in Buffalo, NY, and the Central U.S. Earthquake Consortium (CUSEC), but more could be done. For example, NEHRP-funded researchers could be provided with increased incentives to share the results of their work with the public and with relevant industries. Today, most research grants do not require and make no provision for such outreach activities.

Updating of the original Earthquake Act

Since it was enacted in 1977, the Earthquake Act has become somewhat outdated. When the NEHRP was created, the emphasis was on the research needed to understand and assess earthquake risks and on the development of techniques for reducing earthquake damage. While these aspects of the NEHRP continue to be critical parts of the program, the NEHRP also is doing more to apply the research that has been done, to educate the public about earthquakes, and to increase earthquake preparedness nationwide. In addition, certain elements of the original Earthquake Act now appear outmoded, particularly those on predicting earthquakes, which appears to be much more difficult than imagined in 1977. The Earthquake Act should reflect the changed and expanded scope of the NEHRP.

Improved coordination of the NEHRP

Providing coordination between agencies with very different missions and cultures is a recurring problem in the Federal Government, and the NEHRP is no exception. In the past, the NEHRP agencies have functioned more as four independent agencies, each with a different agenda, than as contributors to a single earthquake program. Efforts have been duplicated and, just as importantly, critical needs have gone unaddressed. However, this situation is improving. Communication among the NEHRP agencies is quite good, and FEMA, as lead agency, is devoting much more high-level attention to the NEHRP than in the past. Still, more re-

mains to be done. The roles of the agencies can be better defined, both informally and in legislation, and the agencies' budgets for earthquake activities need to be developed in tandem in order to ensure a complete, coherent interagency program.

Safety of Federal buildings

There is growing concern that many of the more than 400,000 buildings which the Federal Government owns or leases are vulnerable to a major earthquake. In many cases, Federal buildings are less earthquake-resistant than nearby privately-owned buildings. In several recent earthquakes in California, public buildings suffered a disproportionate amount of damage. There is particular concern that Federal hospitals and military bases might not survive a major earthquake and thus would be unable to provide critically-needed services and resources to earthquake victims. The collapse of a Veterans Administration hospital in the 1971 San Fernando earthquake underscored this problem.

In 1978, the Interagency Committee on Seismic Safety in Construction (ICSSC) was established as part of the NEHRP so that Federal departments and agencies could work together to develop earthquake hazards reduction measures which each agency could implement. At present, 25 agencies are represented on the ICSSC, including the General Services Administration, DOD, and the Department of Veterans Affairs.

For more than 10 years, the ICSSC has been developing seismic design guidelines for new and existing Federal buildings and facilities. In 1987, the ICSSC published "Seismic Design Guidelines for Federal Buildings" (ICSSC RP-1) which are intended primarily for new buildings. In March 1989, these were followed by "Guidelines for Identification and Mitigation of Seismically Hazardous Existing Federal Buildings" (ICSSC RP-3). In 1986, the ICSSC prepared a draft executive order on "Seismic Safety of Federal and Federally Assisted or Regulated Construction," which would require the systematic application of these guidelines or equivalent measures in the construction-related programs of Federal agencies. After several revisions, the draft became Executive order 12699, which the President signed on January 5, 1990. Effort must continue to be made to improve the safety of Federal buildings in the event of an earthquake.

LEGISLATIVE HISTORY

S. 2789 builds upon four bills introduced earlier during the 101st Congress: S. 629, S. 1062, H.R. 3533, and H.R. 4362. On March 16, 1989, Senator Cranston introduced S. 629, which was cosponsored by Senators Hollings, Gore, and Wilson. That bill would provide better interagency coordination and update the focus of the program to reflect our improved understanding of earthquakes. In response to testimony at the April 7, 1989 hearing on S. 629 held by the Subcommittee on Science, Technology, and Space, Senators Gore and Danforth introduced S. 1062 on May 18, 1989. That bill would require a greater emphasis by the NEHRP on public education of earthquake risks and available mitigation measures and on

applying the research that has been done on earthquakes and earthquake engineering.

At its August 1, 1989, executive session, the Committee ordered reported favorably an amendment in the nature of a substitute for S. 1062, which included several provisions of S. 629. The amendment was sponsored by Senators Gore, Danforth and Hollings.

S. 1062 was approved by the Senate on October 25, 1989, one week after the Loma Prieta earthquake. During Senate consideration, the bill was amended to provide for improved emergency broadcast capability in earthquake-prone areas and to authorize an additional \$20 million for the NEHRP program, including \$8 million for post-earthquake investigations.

On October 26, 1989, Representative Emerson introduced H.R. 3533, which was nearly identical to S. 1062 as approved by the Senate. On March 22, 1990, Representative Fazio introduced H.R. 4362 to authorize the NEHRP and amend the Earthquake Act. Both bills were referred to the House Committee on Interior and Insular Affairs and the House Committee on Science, Space, and Technology. Some provisions of H.R. 4362 were incorporated into H.R. 3533, which was reported favorably by the House Interior Committee on April 26, 1990, and the House Science Committee on July 19, 1990.

On December 11, 1989, the Senate Subcommittee on Science, Technology, and Space held a field hearing in Memphis, TN on preparing the United States for natural disasters. In particular, the hearing evaluated the threat that earthquakes pose to the central United States and examined the goals of the International Decade of Natural Disaster Reduction. On March 29, 1990, the Science, Technology and Space Subcommittee held a hearing on the reauthorization of the NEHRP and on the vulnerability of Federal buildings to earthquakes. At the hearing, witnesses testified that additional funds are needed for engineering research, geological studies, and mitigation activities. On June 26, 1990, Senator Gore introduced S. 2789, which is cosponsored by Senators Danforth, Hollings, Ford, Inouye, Bryan, Gorton, Cranston, Akaka, Bumpers, Reid, Simon, and Packwood. The bill was referred to the Committee, which in open executive session ordered it reported favorably without objection on June 27, 1990.

SUMMARY OF MAJOR PROVISIONS

The bill authorizes the NEHRP for fiscal year 1991-92. It also revises, updates, and reorganizes the original Earthquake Act and, in particular, clarifies the roles of the agencies in the NEHRP. Much of the language in S. 2789 is from the original Earthquake Act. There is also language included from S. 1062 as passed by the Senate and H.R. 3533. The major provisions are as follows:

(1) Section 2 amends the findings section of the Earthquake Act to update and expand the findings of that Act.

(2) Section 3 amends the purpose section of the Earthquake Act to merge the objectives and purpose sections of the original Earthquake Act.

(3) Section 4 defines the responsibilities of FEMA as lead agency of the NEHRP. FEMA is required to work with the

other lead agencies to plan, coordinate, and report on NEHRP activities.

(4) Section 5 defines the program responsibilities of the four NEHRP agencies. The bill defines and clarifies, but does not change significantly, the present roles of the NEHRP agencies.

(5) Section 6 adds a requirement that OSTP, which is responsible for coordinating interagency research programs, report to Congress on the role OSTP can play in the coordination of the NEHRP.

(6) Section 7 requires the establishment of a NEHRP Advisory Committee by the Director of FEMA.

(7) Section 8 requires that the President adopt, not later than June 1, 1994, standards for assessing and enhancing the seismic safety of existing buildings constructed for or leased by the Federal Government which were designed and constructed without adequate seismic design and construction standards.

(8) Section 9 permits FEMA to accept and use bequests, gifts, or donations of services, money, or property.

(9) Section 10 limits the amount of cost-sharing that FEMA can require from States receiving earthquake preparedness grants.

(10) Section 11 requires the creation of a program for post-earthquake studies following major earthquakes.

(11) Section 12 provides authorizations for the four NEHRP agencies for fiscal year 1991 and 1992. In addition, authorizations for fiscal year 1990 are increased to accommodate additional funding provided in the Dire Emergency Fiscal Year 1990 Supplemental Appropriations Act (Dire Supplemental) following the Loma Prieta earthquake. Authorizations total \$105.06 million for fiscal year 1990, \$102.75 million for fiscal year 1991, and \$120.25 million for FY 1992.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office.

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, July 5, 1990.

Hon. ERNEST F. HOLLINGS,
Chairman, Committee on Commerce, Science and Transportation,
U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for S. 2789, the National Earthquake Hazards Reduction Program Reauthorization Act.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

ROBERT D. REISCHAUER,
Director.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: S. 2789.
 2. Bill title: National Earthquake Hazards Reduction Program Reauthorization Act.

3. Bill status: As ordered reported by the Senate Committee on Commerce, Science, and Transportation on June 27, 1990.

4. Bill purpose: S. 2789 would authorize the appropriation of specific sums in fiscal years 1991 through 1992 for the National Earthquake Hazards Reduction Program (NEHRP) in four agencies: the Federal Emergency Management Agency (FEMA), the U.S. Geological Survey (USGS), the National Science Foundation (NSF), and the National Institute of Standards and Technology (NIST). The bill also would make a number of changes to the present system of state cost-sharing for earthquake hazard reduction programs. In addition, the bill would require the Office of Science and Technology Policy (OSTP) to report to the Congress within three months of the bill's enactment of planning within the NEHRP, and for the General Accounting Office to prepare a report on the seismic vulnerability of buildings owned or leased by the federal government.

The four agencies listed above have allocated \$72.3 million for the NEHRP for fiscal year 1990, and the President is requesting \$73.7 million for this program in 1991.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1991	1992	1993	1994	1995
Authorizations:					
FEMA	14.8	17.0			
USGS	50.0	55.0			
NSF	37.0	44.3			
NIST	1.0	4.0			
Total authorizations	102.8	120.3			
Estimated outlays	77.7	110.0	28.5	6.0	0.8

The costs of this bill fall within budget functions 250, 300, 370, and 450.

Basis of estimate: For the purposes of this estimate, we have assumed that the full amounts authorized by the bill will be appropriated for each fiscal year. Outlays reflect historical spending patterns of the relevant agencies. We do not expect that the OSTP and GAO studies required by the bill would result in any significant additional costs.

6. Estimated cost to State and local governments: Some of the funds authorized for FEMA would be for grants to state governments. Under this grant program, states would be required to provide a matching contribution of up to a 1:1 rate. States that have not previously participated in the program would be charged a lower rate and allowed to make in-kind contributions toward their match.

7. Estimate comparison: None.

8. Previous CBO estimate: CBO has prepared estimates for two versions of H.R. 3533, a bill that also reauthorizes the NEHRP. On

April 5, 1990, CBO prepared a cost estimate for H.R. 3533, as ordered reported by the House Committee on Interior and Insular Affairs on April 4, 1990; and, on June 27, 1990, CBO prepared an estimate for H.R. 3533, as ordered reported by the House Committee on Science, Space, and Technology on June 13, 1990.

9. Estimate prepared by: Michael Sieverts.

10. Estimate approved by: James L. Blum, Assistant Director for Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported.

NUMBER OF PERSONS COVERED

This legislation updates and expands the goals and activities of the Earthquake Act. It also requires that the President adopt standards for assessing and enhancing the seismic safety of existing buildings constructed for or leased by the Federal Government which were designed and constructed without adequate seismic design and construction standards. Such standards shall be developed by the ICSSC by June 1, 1994. The number of buildings and persons affected by these standards will depend upon their implementation. At present, the Federal Government owns or leases more than 400,000 buildings nationwide.

In addition, this legislation requires that the President ensure issuance, before February 1, 1993, by all Federal agencies of final regulations required by section 4(b) of Executive Order 12699, which provides for design and construction standards for new Federal buildings. These regulations will improve the safety of thousands of Federal Government workers and others who occupy Federal buildings.

ECONOMIC IMPACT

This legislation authorizes the following funding for the NEHRP for fiscal years 1990-92: \$20 million to augment FY 1990 authorizations provided in the last authorization bill for the NEHRP, Public Law 100-252 (102 Stat. 18), \$102.75 million for fiscal year 1991, and \$120.25 million for fiscal year 1992. By providing for better inter-agency coordination of the NEHRP and defining more clearly the roles of the agencies in the NEHRP, the bill should improve the effectiveness of monies spent on earthquake research and earthquake preparedness.

The issuance of Federal seismic standards for the design and construction of new Federal buildings and the adoption of standards for enhancing the safety of existing Federal buildings could result in both increased building costs and significant savings due to the prevention of loss of life and property damage during earthquakes. The actual economic impact of the standards will depend upon their implementation.

The costs of applying these standards will also vary from region to region due to variations in the threat posed by earthquakes. For most of the United States, designing and constructing a new build-

ing to meet existing NEHRP-recommended building code provisions would add less than one or two percent to the cost of the building. In many cases, there would be no additional costs.

In addition to ensuring that new Federal buildings are earthquake-resistant, earthquake engineers agree that there is a great need to improve the seismic safety of the huge stock of existing Federally-owned or occupied buildings. For existing buildings, the cost of seismic retrofitting (adding structural supports to an existing building to make it more earthquake-resistant) varies with the type of building and the degree of seismic resistance desired. For typical seismic retrofitting projects, costs are between \$3 and \$13 per square foot for existing buildings ("Typical Costs for Seismic Rehabilitation of Existing Buildings," FEMA, July, 1988).

In general, it is difficult to develop a detailed cost estimate for improving the seismic safety of Federal buildings because the technology of seismic design and retrofitting of existing buildings is still evolving and costs are decreasing as architects and builders become more familiar with seismic design. However, many inexpensive steps, such as securing light fixtures and bookshelves, could reduce significantly the risks posed by earthquakes.

It is likewise difficult to estimate the benefits provided by seismic construction, since earthquakes are infrequent and it is difficult to assess the total cost, in terms of property loss, lost economic activity, and loss of life, resulting from building collapse during earthquakes. However, it is clear that a single earthquake could result in tens of billions of dollars of property damage and tens of thousands of deaths, due mostly to the collapse of buildings and other structures. Many of the 25,000 deaths and much of the destruction caused by the December 1988 Armenian earthquake would have been avoided if seismic construction practices like those required in California had been utilized.

PRIVACY

This legislation will not have any adverse impact on the personal privacy of the individuals involved.

PAPERWORK

This legislation requires the issuance of Federal seismic design and construction standards for new Federal buildings by June 1, 1993, and adoption of standards for assessing and enhancing the seismic safety of existing federally-owned or -leased buildings by June 1, 1994. There would be no significant changes in the paperwork required of applicants for the various earthquake-related grant programs at NSF, the USGS, and FEMA.

SECTION-BY-SECTION ANALYSIS

SECTION 1.—SHORT TITLE

This section states that the bill may be cited as the "National Earthquake Hazards Reduction Program Reauthorization Act".

SECTION 2.—FINDINGS

This section amends section 2, the congressional findings section of the Earthquake Act, which created the multi-agency NEHRP. It deletes two findings, one on earthquake prediction and one on the possibility of controlling or moderating earthquakes. Three new paragraphs are added regarding the need for the geological study of active faults for long-term seismic risk assessments, the benefits of earthquake-resistant building practices, and the need for Federal Government buildings and facilities to pose no greater hazards to their occupants and to the community than other, non-Federal facilities.

SECTION 3.—PURPOSE

Section 3 would amend section 3, the purpose section, of the Earthquake Act to consolidate language on the objectives of the NEHRP presently scattered throughout the Earthquake Act. The purpose of the original Earthquake Act is to "reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program." This section adds the following objectives of the program:

- (1) education of the public on earthquake hazards;
- (2) development of improved design and construction techniques for improving the earthquake resistance of structures and lifelines;
- (3) identification, evaluation, and characterization of seismic risks for all areas of the United States with high or moderate seismic risk;
- (4) development, publication, and promotion of model seismic building codes;
- (5) improvement of earthquake preparedness;
- (6) increased application of existing scientific and engineering knowledge to earthquake mitigation; and
- (7) development of ways to assure the availability of earthquake insurance.

SECTION 4.—DEFINITIONS

Section 4 amends section 4, the definitions section, of the Earthquake Act to include new definitions of "Program" (NEHRP, "lifelines" (pipelines, roads, railroads, electrical power and communications networks, and water supply and sewage treatment facilities) and "Program agencies" (FEMA, the USGS, NSF, and NIST).

SECTION 5.—NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM

Section 5 replaces existing section 5 of the Earthquake Act on agency responsibilities. New subsection (a) of section 5 establishes the NEHRP. Subsection (b) outlines the responsibilities of the lead agency and the four program agencies. (The original Earthquake Act did not specify the responsibilities of each program agency.)

Paragraph (1) of subsection (b) clarifies the role of FEMA as the lead agency of the NEHRP. The Director of FEMA is to prepare, in conjunction with the other program agencies, an annual budget for

the NEHRP to be submitted to the Office of Management and Budget (OMB). The Committee believes that this is the first step in setting up a truly coordinated program. The budget proposal required by this section is intended to be more than just an exercise in adding up previously prepared individual agency budgets and should resemble the interagency Global Change Program budget prepared by the Committee on Earth Sciences.

The Director of FEMA is to promote the implementation of earthquake hazards reduction measures, as identified by the NEHRP and other Federal agencies, by Federal, State, and local governments, and by other organizations. The Director of FEMA, in conjunction with the Program agencies, is to prepare a plan for the NEHRP, which shall include specific tasks and milestones for each Program agency, and which shall be submitted to Congress no less frequently than every three years. The Director of FEMA, in conjunction with the other program agencies, is to prepare a biennial report to Congress describing the activities and achievements of the NEHRP. The Director of FEMA is authorized to request the assistance of Federal agencies other than the program agencies.

The leadership function of FEMA shall be separate from the operational management of the research and implementation aspects of the NEHRP for which FEMA is responsible. In the past, coordination of the NEHRP has been the responsibility of a single staff member at FEMA reporting to the manager of FEMA's earthquake program. In order to coordinate successfully the program, the lead agency must ensure that its efforts are headed by an individual of stature and responsibility within the agency. The bill requires that the principal official carrying out the lead agency responsibilities be at a level no lower than that of Associate Director. That official should report directly to the Director. This provision also would separate the coordination of the NEHRP from the management of FEMA's own earthquake program and allow the staff responsible for coordinating the program to focus exclusively on ensuring proper coordination of the NEHRP. FEMA should consider establishing an Office of Earthquake or an Office of Natural Hazards to ensure that the earthquake program receives the high-level attention it needs.

Paragraph (2) of subsection (b) specifies the contributions of FEMA to the NEHRP. The Director of FEMA shall:

- (1) operate a program to provide States with grants and technical assistance to improve earthquake preparedness, improve building codes, increase earthquake awareness, and encourage the development of multi-State groups (e.g., the Central United States Earthquake Consortium) for such purposes;

- (2) prepare and execute, with the Department of Education, other Federal agencies, and private sector groups, a comprehensive earthquake education and public awareness program—the Department of Education is well-suited to distribute information and curricula developed by FEMA;

- (3) prepare and disseminate, with the assistance of NIST and other Federal agencies, and private sector groups, information on building codes and practices for structures and lifelines;

- (4) develop and coordinate Federal interagency earthquake response plans for each high seismic risk area in order to

ensure the availability of adequate emergency medical resources, search and rescue personnel and equipment, and emergency broadcast capability;

(5) develop approaches to combine measures for earthquake hazards reduction with measures for the reduction of other natural and technological hazard—many of the measures needed to make a building or facility less vulnerable to earthquakes also make it less vulnerable to damage due to hurricanes, tornados, and other hazards, and therefore, the Committee urges FEMA to adopt an all-hazard approach in its mitigation programs; and

(6) provide response recommendations to communities after an earthquake prediction has been made under paragraph (3)(D) of this subsection.

In addition, the Director of FEMA may provide funding to State and local jurisdictions to promote earthquake hazard mitigation and education about earthquakes. In awarding grants to States and localities for emergency operation centers, the Director of FEMA shall give priority to applicants who propose to incorporate hazard mitigation and/or research programs into emergency management activities.

Paragraph (2)(B) requires that States, in order to qualify for grants for earthquake preparedness, must demonstrate that the assistance will result in enhanced seismic safety in the State. This provision will enable Congress and the Administration to evaluate more accurately the effectiveness of the FEMA State grant program.

Paragraph (2)(C) provides cost-sharing requirements for FEMA's NEHRP grants to States. States which have received such grants prior to October 1, 1990, shall not be required to provide more than 50 percent of the cost of the project for which the grant is made. Cost-sharing requirements for other States are to be phased in. During the first fiscal year of such a grant, the State shall not be required to provide more than 25 percent of the cost of the project for which the grant is made. In other words, States must not be required to provide more than 50 cents for each \$1.50 of Federal funding. For the second fiscal year, the States shall not be required to provide more than 50 percent of the cost of the project (or more than one dollar for each dollar of Federal aid). For the first two years the State's contribution can be in cash or in kind. After 2 fiscal years, the State shall not be required to provide more than 50 percent of the cost of the program in cash.

Prior to fiscal year 1989, States in FEMA's State grant program were not required to provide any matching funds. After passage of Public Law 100-252 (102 Stat. 18), which reauthorized the NEHRP for fiscal years 1988-1990, FEMA phased in a 50 percent matching grant requirement during fiscal years 1989 and 1990, in a way similar to that provided in this bill. It is unfair to ask States new to the program to provide 50 percent matching funds in their first 2 years in the program. Waiving the requirement that States provide 50 percent matching funds in cash for the first 2 years would encourage more States to enter the program.

Paragraph (3) assigns programs responsibilities to the USGS. The USGS shall conduct research necessary to characterize and identify

earthquake hazards, assess earthquake risks, monitor seismic activity, and improve earthquake predictions. The Director of the USGS shall conduct a systematic assessment of the seismic risks of each region of the Nation prone to earthquakes and work with officials of State and local governments to ensure that they are knowledgeable about the specific seismic risks in their areas.

The Committee notes that the USGS's contribution to the NEHRP includes both basic and applied research on earthquakes, and recognizes that both are needed to improve our understanding of earthquakes. Promising new research results on precursors to the Loma Prieta earthquake, such as reports of elevated soil helium concentrations along the San Andreas Fault and anomalous ultra-low-frequency signals detected in the epicentral region, highlight the need for a broad, basic research program on earthquakes at the USGS.

The Director of the USGS shall establish standard procedures for issuing and evaluating earthquake predictions. The USGS's National Earthquake Prediction Evaluation Council (NEPEC) shall be exempt from provisions of the Federal Advisory Committee Act which require Federal Register notices of advisory committee meetings, because NEPEC meetings sometimes must be called on very short notice to evaluate short-term predictions of pending earthquakes.

The Director of the USGS also shall establish a Center for the International Exchange of Earthquake Information at the USGS. The purpose of such a center is the promotion of the two-way exchange of information on earthquake research and earthquake preparedness between the United States and other countries. The Committee supports efforts, like the International Decade of Natural Disaster Reduction, that are intended to promote distribution of information on earthquakes and other natural hazards. The United States has much to share and much to gain through such an international exchange of information.

In addition, the Director of the USGS shall operate a National Seismic Network, which shall complement and support regional seismic networks. Continued funding for these regional seismic networks is essential since they provide information on the smallest earthquakes, which cannot be detected or accurately located by the National Seismic Network now being deployed. Data on these micro-earthquakes are necessary for assessment of long-term seismic risks and research on earthquake prediction.

Paragraph (4) specifies the program responsibilities of NSF. NSF shall be responsible for funding research on earth sciences to improve the understanding of the causes and behavior of earthquakes, on earthquake engineering, and on human response to earthquakes. The primary mission of NSF is to fund and foster basic research in science and engineering, particularly in U.S. colleges and universities. The Committee recognizes that, since NSF is not a mission-oriented agency, its contribution to the NEHRP will not be particularly focused and often will include many projects that provide long-term, rather than immediate, benefits. NSF should continue to fund such fundamental research as well as research with more immediate benefits.

Within earthquake engineering, NSF shall emphasize development of economically feasible methods to retrofit existing buildings and to protect lifelines to mitigate earthquake damage. NSF shall encourage prompt dissemination of research results to organizations which promote earthquake hazard mitigation. NSF also shall fund studies on factors that influence the implementation of hazard reduction measures.

Paragraph (5) gives NIST responsibility for research and development to improve building codes and standards and practices for structures and lifelines. NIST can and should play a much larger role in the NEHRP, particularly in developing improved techniques for protecting lifelines from damage during earthquakes. The Loma Prieta earthquake highlighted the need to strengthen highways, bridges, gas and water lines, and other lifelines. Most of the deaths in the Loma Prieta earthquake were due to the collapse of the Cypress Street Viaduct in Oakland. In the Marina District of San Francisco, damage caused by the earthquake was compounded by fires due to broken gas mains which were difficult to extinguish because of broken water mains. To expand work on the seismic safety of lifelines at NIST's Center for Building Technology, this legislation would provide a large increase in the authorization for NIST's contribution to the NEHRP. Such an increase is needed if NIST is to be a major participant in the NEHRP.

NIST shall work closely with FEMA and national standards and model building code organizations to encourage transfer of research results to the user community, to promote better building practices among architects and engineers, and to develop seismic safety standards and practices for new and existing lifelines. The Committee notes that over the years NIST, and particularly its Center for Building Technology, has developed close ties to professionals in the building construction and design industries. These ties, along with FEMA's links to the emergency management community, should be strengthened, through seminars, workshops, publications, and other means, in order to disseminate better the results of research done at NIST.

SECTION 6.—OFFICE OF SCIENCE AND TECHNOLOGY POLICY REPORT

This section amends section 6 of the Earthquake Act. The revised section 6 requires OSTP to report to Congress within three months after the date of enactment of this bill on OSTP's role in interagency coordination, planning, and operation of the NEHRP. In recent years OSTP has provided valuable coordination of interagency research programs, like the U.S. Global Change Research Program and the Federal High-Performance Computing Program. Such coordination allows the science agencies and OMB to identify and eliminate duplication of efforts and gaps in Federal research efforts.

SECTION 7.—ADVISORY COMMITTEE

This section adds a new section 7 to the Earthquake Act. The new section 7 establishes a NEHRP Advisory Committee and requires that the Director of FEMA, in consultation with the directors of the program agencies, determine the number of members on

the Advisory Committee and the duration of their terms. The Advisory Committee shall include representatives of State and local governments, the design professions, the research community, business and industry, and the general public. The Advisory Committee shall submit a written annual report directly to Congress which shall describe any recommendations the Advisory Committee has made to NEHRP agencies during the preceding year.

SECTION 8.—SEISMIC STANDARDS

Subsection (a) of this section adds a new section 8 to the Earthquake Act. It requires that the President adopt, not later than June 1, 1994, standards for assessing and enhancing the seismic safety of existing buildings constructed for or leased by the Federal Government that were designed and constructed without adequate seismic design and construction standards. These standards shall be developed by the ICSSC, which is chaired by the Director of NIST (or the Director's designee). The Committee intends that these standards apply only to buildings in which the Federal Government occupies at least 50 percent of the floor space of the building. The President shall report to Congress by June 1, 1994, on how these standards might be applied to buildings regulated, insured, or financed by Federal programs. The President shall ensure the issuance, before February 1, 1993, by all Federal agencies of final regulations under section 4(b) of Executive Order 12699, which requires Federal agencies to implement seismic safety guidelines for buildings they own, lease, regulate, or finance. The Director of NIST shall submit to Congress, not later than June 30, 1992, a plan for developing and adopting design and construction standards for lifelines.

Subsection (b) of this section requires that the Comptroller General report to Congress, not more than eighteen months after the date of enactment of the legislation, on the seismic risks faced by Federal agency to reduce those risks. The Committee understands that such a study will not be able to assess the vulnerability of every Federal building. However, at present there is very little information on the seismic vulnerability of Federal buildings. There are no credible estimates of the number of Federal buildings or building occupants that are at risk due to earthquakes. At the March 29, 1990, Science, Technology, and Space Subcommittee hearing on the NEHRP reauthorization, it was clear that some agencies have been much more diligent than others in addressing the vulnerability of the buildings and lifelines they own, lease, control, and regulate. The required General Accounting Office report should help highlight the most vulnerable Federal buildings and indicate where additional earthquake hazard mitigation efforts are most needed.

SECTION 9.—ACCEPTANCE OF GIFTS

This section adds a new section 9 to the Earthquake Act, which allows FEMA to accept and use bequests, gifts, or donations of services, money, or property. Subsection (b) of the new section directs the FEMA Director to establish by regulation criteria for accepting such bequests, gifts, or donations, which should take into consider-

ation the impact of such acceptance on the Director's ability to conduct business fairly and objectively or on the integrity of the NEHRP. This authority is similar to that granted by other statutes to other NEHRP agencies.

SECTION 10.—NON-FEDERAL COST SHARING

This section inserts a new section 10 of the Earthquake Act, which stipulates that FEMA shall not require that a State provide more than 25 percent of the cost of a project funded by a grant from monies appropriated in the Dire Supplemental passed by Congress after the Loma Prieta earthquake. This cost-sharing requirement may be satisfied through in-kind contributions. The Committee is interested in seeing this additional grant money distributed quickly to capitalize on the public's heightened awareness of earthquake hazards due to the Loma Prieta earthquake and believes that this provision will accelerate distribution of these grants.

SECTION 11.—EARTHQUAKE INVESTIGATIONS

This section, under subsection (a), inserts a new section 11 of the Earthquake Act. The new section establishes within the USGS an Earthquake Investigations Program to provide for post-earthquake investigations following major earthquakes. Program agencies will investigate the causes and effects of the earthquakes, their effects on structures and how earthquake damage might be reduced, and how the agencies' NEHRP programs might be improved and strengthened. The Director of the USGS is authorized to provide funding to the other NEHRP agencies, other Federal agencies, and private contractors.

Under subsection (b) of this section, the Director of FEMA, in consultation with the other NEHRP agencies, is required to report to Congress, not more than one year after the date of enactment of the legislation, on possible options for funding a program for post-earthquake investigations.

It is appropriate that the USGS, which receives a majority of NEHRP funding, coordinate the research and investigations needed to assess the cause and the impact of a major earthquake. Following the Loma Prieta earthquake, the USGS worked closely with the other NEHRP agencies to coordinate the agencies' investigations of that earthquake and distributed to the other agencies much of the \$8 million provided for that purpose. The Committee hopes that establishing a permanent post-earthquake investigation program will eliminate the need for the type of ad-hoc funding mechanism used to provide for post-Loma Prieta earthquake investigations. Proper planning prior to an earthquake can ensure full cooperation, close coordination, and rapid and fair distribution of funding after the event.

In the past, funding of post-earthquake investigations has usually come at the expense of ongoing earthquake research programs, causing a major disruption of NSF, USGS, and NIST programs. For this reason and others, the 1987 Expert Panel Review of the NEHRP recommended establishment of a permanent post-earthquake investigation program. The FEMA study required by this section should provide Congress with options that will ensure a

stable source of funding to provide for thorough, rapid post-earthquake investigations.

SECTION 12.—AUTHORIZATION OF APPROPRIATIONS

Section 12 amends the Earthquake Act to authorize funding for the four NEHRP agencies for FY 1991 and 1992. In addition, it increases authorizations for FY 1990 to accommodate additional funding provided in the Dire Supplemental following the Loma Prieta earthquake. Funds appropriated for FY 1991 and 1992 under this section shall remain available until expended.

FUNDING LEVELS FOR THE NEHRP

[In millions of dollars]

Agency	Fiscal year 1989 appropriations	Fiscal year 1990 appropriations	Fiscal year 1990 supplemental	Authorizations in S. 2789		
				Fiscal year 1990	Fiscal year 1991	Fiscal year 1992
FEMA	5.800	6.109	3.00	8.798	14.75	17.0
USGS	34.688	34.443	12.00	55.283	50.0	55.0
NSF	23.340	23.320	3.00	38.454	37.0	44.25
NIST	.525	.525	2.00	2.525	1.00	4.0
Total	64.353	64.397	20.00	105.06	102.75	120.25

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in *italic*, existing law in which no change is proposed is shown in roman).

EARTHQUAKE HAZARDS REDUCTION ACT OF 1977

Section 2 of that Act

SEC. 2 FINDINGS.

The Congress finds and declares the following:

(1) through (4) * * *

[(5) An operational earthquake prediction system can produce significant social, economic, legal, and political consequences.]

(5) The geological study of active faults and features can reveal how recently and how frequently major earthquakes have occurred on those faults and how much risk they pose. Such long-term seismic risk assessments are needed in virtually every aspect of earthquake hazards management, whether emergency planning, public regulation, detailed building design, insurance rating, or investment decision.

[(6) There is a scientific basis for hypothesizing that major earthquakes may be moderated, in at least some seismic areas, by application of the findings of earthquake control and seismological research.]

(6) The vulnerability of buildings, lifelines, public works, and industrial and emergency facilities can be reduced through proper

earthquake resistant design and construction practices. The economy and efficacy of such procedures can be substantially increased through research and development.

(7) Programs and practices of departments and agencies of the United States are important to the communities they serve; some functions, such as emergency communications and national defense, and lifelines, such as dams, bridges, and public works, must remain in service during and after an earthquake. Federally owned, operated, and influenced structures and lifelines should serve as models for how to reduce and minimize hazards to the community.

[(7)] *(8) The implementation of earthquake hazards reduction measures would, as an added benefit, also reduce the risk of loss, destruction, and disruption from other natural hazards and man-made hazards, including hurricanes, tornadoes, accidents, explosions, landslides, building and structural cave-ins, and fires.*

[(8)] *(9) Reduction of loss, destruction, and disruption from earthquakes will depend on the actions of individuals, and organizations in the private sector and governmental units at Federal, State, and local levels. The current capability to transfer knowledge and information to these sectors is insufficient. Improved mechanisms are needed to translate existing information and research findings into reasonable and usable specifications, criteria, and practices so that individuals, organizations, and governmental units may make informed decisions and take appropriate actions.*

[(9)] *(10) Severe earthquakes are a worldwide problem. Since damaging earthquakes occur infrequently in any one nation, international cooperation is desirable for mutual learning from limited experiences.*

[(10)] *(11) An effective Federal program in earthquake hazards reduction will require input from and review by persons outside the Federal Government expert in the sciences of earthquake hazards reduction and in the practical application of earthquake hazards reduction measures.*

Section 3 of that Act

SEC. 3. PURPOSE.

It is the purpose of the Congress in this Act to reduce the risks of life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. *The objectives of such program shall include—*

(1) the education of the public, including State and local officials, as to earthquake phenomena, the identification of locations and structures which are especially susceptible to earthquake damage, ways to reduce the adverse consequences of an earthquake, and related matters;

(2) the development of technologically and economically feasible design and construction methods and procedures to make new and existing structures, in areas of seismic risk, earthquake resistant, giving priority to the development of such methods and procedures for power generating plants, dams, hospitals, schools, public utilities and other lifelines, public safety struc-

tures, high occupancy buildings, and other structures which are especially needed in time of disaster;

(3) the identification, evaluation, and accurate characterization of seismic hazards in all areas of high or moderate seismic risk;

(4) the development, publication, and promotion, in conjunction with State and local officials and professional organizations, of model building codes and other means to ensure that information about seismic risk is considered in land-use policy decisions and construction activity;

(5) the development, in areas of seismic risk, of improved understanding of, and capability with respect to, earthquake-related issues, including methods of mitigating the risks from earthquakes, planning to prevent such risks, disseminating warnings of earthquakes, organizing emergency services, and planning for reconstruction and redevelopment after an earthquake;

(6) the development of ways to increase the use of existing scientific and engineering knowledge to mitigate earthquake hazards; and

(7) the development of ways to assure the availability of affordable earthquake insurance.

Section 4 of that Act

SEC. 4. DEFINITIONS.

As used in this Act, unless the context otherwise requires:

(1) * * *

[(2) The term "program" means the earthquake hazards reduction program established under section 5.]

(2) The term "Program" means the National Earthquake Harards Reduction Program established under section 5.

(3) through (5) * * *

(6) The term "lifelines" means public works and utilities, including transportation facilities and infrastructure, oil and gas pipelines, electrical power and communication facilities, and water supply and sewage treatment facilities.

(7) The term "Program agencies" means the Federal Emergency Management Agency, the United States Geological Survey, the National Science Foundation, and the National Institute of Standards and Technology.

Section 5 of that Act

[SEC. 5. NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM.

[(a) ESTABLISHMENT.—The President shall establish and maintain, in accordance with the provisions and policy of this Act a coordinated earthquake hazards reduction program, which shall—

[(1) be designed and administered to achieve the objectives set forth in subsection (c);

[(2) involve, where appropriate, each of the agencies listed in subsection (d) and the non-Federal participation specified in subsection (h); and

[(3) include each of the elements described in subsections (e) and (f) and the assistance to the States specified in subsection (g).

[(b) DUTIES.—(1) The President shall—

[(A) assign and specify the role and responsibility of each appropriate Federal department, agency, and entity with respect to each object and element of the program; and

[(B) establish goals, priorities, budgets, and target dates for implementation of the program.

[(2) The Federal Emergency Management Agency (hereinafter referred to as the "Agency") is designated as the agency with the primary responsibilities to plan and coordinate the National Earthquake Hazards Reduction Program. The Director of the Agency (hereinafter referred to as the "Director") shall—

[(A) recommend to the President the role and responsibility of each appropriate Federal department, agency, and entity with respect to each object and element of the program;

[(B) recommend to the President goals, priorities, budgets, and target dates for implementation of the program;

[(C) provide a method for cooperation and coordination with, and assistance (to the extent of available resources) to, interested governmental entities in all States, particularly those containing areas of high or moderate seismic risk;

[(D) provide for qualified and sufficient staffing for the program and its components;

[(E) compile and maintain a written plan for the program specified in subsections (a), (e), (f), and (g), to be submitted to the Congress and updated at such times as may be required by significant program events, but in no event less frequently than every three years;

[(F) make, in cooperation with the United States Geological Survey, the National Science Foundation, and the National Bureau of Standards, an annual presentation to the appropriate committee of the Congress within sixty days after the end of each fiscal year for the purpose of communicating any events and any programmatic requirements deemed significant by the National Earthquake Hazards Reduction Program; and

[(G) recommend appropriate roles for State and local units of government, individuals, and private organizations.

[(c) OBJECTIVES.—The objectives of the earthquake hazards reduction program shall include—

[(1) the development of technologically and economically feasible design and construction methods and procedures to make new and existing structures, in areas of seismic risk, earthquake resistant, giving priority to the development of such methods and procedures for nuclear power generating plants, dams, hospitals, schools, public utilities, public safety structures, high occupancy buildings, and other structures which are especially needed in time of disaster;

[(2) the implementation in all areas of high or moderate seismic risk, of a system (including personnel, technology, and procedures) for predicting damaging earthquakes and for identifying, evaluating, and accurately characterizing seismic hazards;

[(3) the development, publication, and promotion, in conjunction with State and local officials and professional organizations, of model codes and other means to coordinate informa-

tion about seismic risk with land-use policy decisions and building activity;

[(4) the development, in areas of seismic risk, of improved understanding of, and capability with respect to, earthquake-related issues, including methods of controlling the risks from earthquakes, planning to prevent such risks, disseminating warnings of earthquakes, organizing emergency services, and planning for reconstruction and redevelopment after an earthquake;

[(5) the education of the public, including State and local officials, as to earthquake phenomena, the identification of locations and structures which are especially susceptible to earthquake damage, ways to reduce the adverse consequences of an earthquake, and related matters;

[(6) the development of research on—

[(A) ways to increase the use of existing scientific and engineering knowledge to mitigate earthquake hazards;

[(B) the social, economic, legal, and political consequences of earthquake prediction; and

[(C) ways to assure the availability of earthquake insurance or some functional substitute; and

[(7) the development of basic and applied research leading to a better understanding of the control or alteration of seismic phenomena.

[(d) PARTICIPATION.—In assigning the role and responsibility of Federal departments, agencies, and entities under subsection (b)(1)(A), the President shall, where appropriate, include the United States Geological Survey, the National Science Foundation, the Department of Defense, the Department of Housing and Urban Development, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the Department of Commerce, the Energy Research and Development Administration, the Nuclear Regulatory Commission, and the Federal Emergency Management Agency.]

[(e) RESEARCH ELEMENTS.—The research elements of the program shall include—

[(1) research into the basic causes and mechanisms of earthquakes;

[(2) development of methods to predict the time, place, and magnitude of future earthquakes;

[(3) development of an understanding of the circumstances in which earthquakes might be artificially induced by the injection of fluids in deep wells, by the impoundment of reservoirs, or by other means;

[(4) evaluation of methods that may lead to the development of a capability to modify or control earthquakes in certain regions;

[(5) development of information and guidelines for zoning land in light of seismic risk in all parts of the United States and preparation of seismic risk analyses useful for emergency planning and community preparedness;

[(6) development of techniques for the delineation and evaluation of the potential effects of earthquakes, and their application on a regional basis;

[(7) development of methods for planning, design, construction, rehabilitation, and utilization of manmade works so as to effectively resist the hazards imposed by earthquakes;

[(8) exploration of possible social and economic adjustments that could be made to reduce earthquake vulnerability and to exploit effectively existing and developing earthquake mitigation techniques; and

[(9) studies of foreign experience with all aspects of earthquakes.

[(f) MITIGATION ELEMENTS.—The mitigation elements of the program shall provide for—

[(1) ISSUANCE OF EARTHQUAKE PREDICTIONS.—The Director of the United States Geological Survey is hereby given the authority, after notification of the Director, to issue an earthquake prediction or other earthquake advisory as he deems necessary. For the purposes of evaluating a prediction, the National Earthquake Prediction Evaluation Council shall be exempt from the requirements of section 10(a)(2) of the Federal Advisory Committee Act. The Director shall have responsibility to provide State and local officials and residents of an area for which a prediction has been made with recommendations of actions to be taken;

[(2) the development of ways for State, county, local, and regional governmental units to use existing and developing knowledge about the regional and local variations of seismic risk in making their land use decisions;

[(3) the development and promulgation of specifications, building standards, design criteria, and construction practices to achieve appropriate earthquake resistance for new and existing structures;

[(4) an examination of alternative provisions and requirements for reducing earthquake hazards through Federal and federally financed construction, loans, loan guarantees, and licenses;

[(5) the determination of the appropriate role for insurance, loan programs, and public and private relief efforts in moderating the impact of earthquakes;

[(6) dissemination, on a timely basis, of—

[(A) instrument-derived data of interest to other researchers;

[(B) design and analysis data and procedures of interest to the design professions and to the construction industry; and

[(C) other information and knowledge of interest to the public to reduce vulnerability to earthquake hazards;

[(7) transmittal to Congress by the Director of an intra-agency coordination plan for earthquake hazard mitigation and response within thirty days after enactment of this paragraph, which plan shall coordinate all of the directorates of the Agency; and

[(8) the development and implementation by the Director of a preparedness plan for response to earthquake predictions which includes the following items:

[(A) A prototype plan to be in place in one major metropolitan area by September 30, 1981.

[(B) An action plan to be completed for specific adaptations of the prototype plan to other high risk metropolitan areas by September 30, 1981.

[(C) These prediction response plans are to be integrated with preparedness response plans.

[(D) The plans shall include coordination with State and local governmental companion efforts.

[(E) The plans shall be updated as new, relevant information becomes available.

[(g) STATE ASSISTANCE.—In making assistance available to the States under the Disaster Relief Act of 1974 (42 U.S.C. 5121 et seq.), the President may make such assistance available to further the purposes of this Act, including making available to the States the results of research and other activities conducted under this Act.

[(h) PARTICIPATION.—In carrying out the provisions of this section, the President shall provide an opportunity for participation by the appropriate representatives of State and local governments, and by the public, including representatives of business and industry, the design professions, and the research community, in the formulation and implementation of the program.

[(Such non-Federal participation shall include periodic review of the program plan, considered in its entirety, by an assembled and adequately staffed group of such representatives. Any comments on the program upon which group agrees shall be reported to the Congress.)

[(Measures developed pursuant to paragraph 5(f)(1) for the evaluation of prediction techniques and actual predictions of earthquakes shall provide for adequate non-Federal participation. To the extent that such measures include evaluation by Federal employees of non-Federal prediction activities, such measures shall also include evaluation by persons not in full-time Federal employment of Federal prediction activities.)

[(i) STUDY.—Within one year after the date of enactment of this subsection, the Director shall conduct a study and prepare and transmit recommendations to Congress to amend the Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121, et seq.) to include provisions for funding for the period of time following a validated earthquake prediction.

[(j) COST SHARING.—(1) In the case of any State which has voluntarily engaged in cost sharing by matching Federal grants from the Federal Emergency Management Agency for activities under this Act over the three-fiscal-year period ending September 30, 1987, any such cost sharing that may be required for the fiscal year ending September 30, 1988, or the fiscal year ending September 30, 1989, shall be at a level no higher than the State's average level of such cost sharing over such three-year period.

[(2) In the case of any State which has not engaged in cost sharing by matching Federal grants from the Federal Emergency Man-

agement Agency for activities under this Act over such three-fiscal-year-period—

[(A) no such cost sharing may be required for the fiscal year ending September 30, 1988; and

[(B) any such cost sharing that may be required for the fiscal year ending September 30, 1989, shall be at a level no higher than 25 percent of the cost of the activities involved.

[(3) Nothing in this subsection shall be construed to prevent a State, voluntarily and at its option, from engaging in cost sharing at a level higher than the maximum level which may be required of it under paragraph (1) or (2).]

SEC. 5. NATIONAL EARTHQUAKE HAZARDS REDUCTION PROGRAM.

(a) **ESTABLISHMENT.**—*There is established a National Earthquake Hazards Reduction Program.*

(b) **RESPONSIBILITIES OF PROGRAM AGENCIES.**—

[(1) **LEAD AGENCY.**—*The Federal Emergency Management Agency (hereinafter in this Act referred to as the "Agency") shall have the primary responsibility for planning and coordinating the Program. In carrying out this paragraph, the Director of the Agency shall—*

(A) *prepare, in conjunction with the other Program agencies, an annual budget for the Program to be submitted to the Office of Management and Budget;*

(B) *ensure that the Program includes the necessary steps to promote the implementation of earthquake hazard reduction measures by Federal, State, and local governments, national standards and model building code organizations, architects and engineers, and others with a role in planning and constructing buildings and lifelines;*

(C) *prepare, in conjunction with the other program agencies, a written plan for the Program, which shall include specific tasks and milestones for each Program agency, and which shall be submitted to the Congress and updated at such times as may be required by significant Program events, but in no event less frequently than every 3 years;*

(D) *prepare, in conjunction with the other Program agencies, a biennial report, to be submitted to the Congress within 90 days after the end of each even-numbered fiscal year, which shall describe the activities and achievements of the Program during the preceeding two fiscal years;*

(E) *request the assistance of Federal agencies other than the Program agencies, as necessary to assist in carrying out this Act; and*

(F) *bring to the attention of the President those proposed Federal programs, regulations, and practices with implications for earthquake hazards reduction and recommend to the President changes that offer improved safety with an assessment of the implications of these changes on safety and economy.*

The principal official carrying out the responsibilities described in this paragraph shall be at a level no lower than that of Associate Director.

[(2) **FEDERAL EMERGENCY MANAGEMENT AGENCY.**—

(A) **PROGRAM RESPONSIBILITIES.**—In addition to the lead agency responsibility described in paragraph (1), the Director of the Agency shall—

(i) operate a program of grants and technical assistance which would enable States to develop preparedness and response plans, prepare inventories and conduct seismic safety inspections of critical structures and lifelines, update building and zoning codes and ordinances to enhance seismic safety, increase earthquake awareness and education, and encourage the development of multi-State groups for such purposes;

(ii) prepare and execute, in conjunction with the Program agencies, the Department of Education, other Federal agencies, and private sector groups, a comprehensive earthquake education and public awareness program, to include development of materials and their wide dissemination to schools and the general public;

(iii) prepare and disseminate widely, with the assistance of the National Institute of Standards and Technology, other Federal agencies, and private sector groups, information on building codes and practices for structures and lifelines;

(iv) develop, and coordinate the execution of, Federal interagency plans to respond to an earthquake, with specific plans for each high-risk area which ensure the availability of adequate emergency medical resources, search and rescue personnel and equipment, and emergency broadcast capability;

(v) develop approaches to combine measures for earthquake hazards reduction with measures for reduction of other natural and technological hazards; and

(vi) provide response recommendations to communities after an earthquake prediction has been made under paragraph (3)(D).

In addition, the Director of the Agency may enter into cooperative agreements or contracts with States and local jurisdictions to establish demonstration projects on earthquake hazard mitigation, to link earthquake research and mitigation efforts with emergency management programs, or to prepare educational materials for national distribution. In the awarding of grants to States and local jurisdictions for an emergency operation center, the Director shall give preference to applicants who propose to incorporate hazard mitigation or research programs into the emergency management activities at the center.

(B) **STATE ASSISTANCE PROGRAM CRITERIA.**—In order to qualify for assistance under subparagraph (A)(i), a State must—

(i) demonstrate that the assistance will result in enhanced seismic safety in the State;

(ii) provide a share of the costs of the activities for which assistance is being given, in accordance with subparagraph (C); and

(iii) meet such other requirements as the Director of the Agency shall prescribe.

(C) NON-FEDERAL COST SHARING.—

(i) In the case of any State which has received, before October 1, 1990, a grant from the Agency for activities under this Act which included a requirement for cost sharing by matching such grant, any grant obtained from the Agency for activities under subparagraph (A)(i) after such date shall not include a requirement for cost sharing in an amount greater than 50 percent of the cost of the project for which the grant is made.

(ii) In the case of any State which has not received, before October 1, 1990, a grant from the Agency for activities under this Act which included a requirement for cost sharing by matching such grant, any grant obtained from the Agency for activities under subparagraph (A)(i) after such date—

(I) shall not include a requirement for cost sharing in an amount greater than 25 percent of the cost of the project for which the grant is made for the first fiscal year of such grant, and any cost sharing requirement may be satisfied through in-kind contributions;

(II) shall not include a requirement for cost sharing in an amount greater than 50 percent of the cost of the project for which the grant is made for the second fiscal year of such grant, and any cost sharing requirement may be satisfied through in-kind contributions; and

(III) shall not include a requirement for cost sharing in an amount greater than 50 percent of the cost of the project for which the grant is made for the third and subsequent fiscal years of such grant.

(3) UNITED STATES GEOLOGICAL SURVEY.—The United States Geological Survey shall conduct research necessary to characterize and identify earthquake hazards, assess earthquake risks, monitor seismic activity, and improve earthquake predictions. In carrying out this paragraph, the Director of the United States Geological Survey shall—

(A) conduct a systematic assessment of the seismic risks in each region of the Nation prone to earthquakes, including, where appropriate, the establishment and operation of intensive monitoring projects on hazardous faults, seismic microzonation studies in urban and other developed areas where earthquake risk is determined to be significant, and engineering seismology studies;

(B) work with officials of State and local governments to ensure that they are knowledgeable about the specific seismic risks in their areas;

(C) develop standard procedures, in consultation with the Agency, for issuing earthquake predictions, including after-shock advisories;

(D) issue when necessary, and notify the Director of the Agency of, an earthquake prediction or other earthquake advisory, which may be evaluated by the National Earthquake Prediction Evaluation Council, which shall be exempt from the requirements of section 10(a)(2) of the Federal Advisory Committee Act when meeting for such purposes;

(E) establish, using existing facilities, a Center for the International Exchange of Earthquake Information which shall—

(i) promote the exchange of information on earthquake research and earthquake preparedness between the United States and other nations;

(ii) maintain a library containing selected reports, research papers, and data produced through the Program;

(iii) answer requests from other nations for information on United States earthquake research and earthquake preparedness programs; and

(iv) direct foreign requests to the agency involved in the Program which is best able to respond to the request; and

(F) operate a National Seismic Network, which shall complement and support regional seismic networks.

(4) NATIONAL SCIENCE FOUNDATION.—The National Science Foundation shall be responsible for funding research on earth sciences to improve the understanding of the causes and behavior of earthquakes, on earthquake engineering, and on human responses to earthquakes. In carrying out this paragraph, the Director of the National Science Foundation shall—

(A) emphasize, in earthquake engineering research, development of economically feasible methods to retrofit existing buildings and to protect lifelines to mitigate earthquake damage;

(B) encourage prompt dissemination of significant findings, sharing of data, samples, physical collections, and other supporting materials, and development of intellectual property so research results can be used by appropriate organizations to mitigate earthquake damage; and

(C) support research that studies the political, economic, and social factors that influence the implementation of hazard reduction measures.

(5) NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—The National Institute of Standards and Technology shall be responsible for carrying out research and development to improve building codes and standards and practices for structures and lifelines. In carrying out this paragraph, the Director of the National Institute of Standards and Technology shall—

(A) work closely with national standards and model building code organizations, in conjunction with the Agency, to promote the implementation of research results;

(B) promote better building practices among architects and engineers; and

(C) work closely with national standards organizations to develop seismic safety standards and practices for new and existing lifelines.

Sections 6 and 7 of that Act

[SEC. 6. ANNUAL REPORT.]

[The President shall, within ninety days after the end of each fiscal year, submit an annual report to the appropriate authorizing committees in the Congress describing the status of the program, and describing and evaluating progress achieved during the preceding fiscal year in reducing the risks of earthquake hazards. Each such report shall include a copy of the program plan described in section 5(b)(2)(E) and any recommendations for legislation and other action the President deems necessary and appropriate.]

SEC. 6. OFFICE OF SCIENCE AND TECHNOLOGY POLICY REPORT.

The Director of the Office of Science and Technology Policy shall, within 3 months after the date of the enactment of the National Earthquake Hazards Reduction Program Reauthorization Act, report to the Committee on Commerce, Science, and Transportation of the Senate and to the Committee on Science, Space, and Technology and the Committee on Interior and Insular Affairs of the House of Representatives with respect to how the Office of Science and Technology policy can play a role in interagency coordination, planning, and operation of the Program.

SEC. 7. ADVISORY COMMITTEE.

There is established a National Earthquake Hazards Reduction Program Advisory Committee (hereafter in this Act referred to as the "Advisory Committee"), which shall advise the Program agencies on planning and implementing the Program. The Director of the Agency shall, in consultation with the directors of the Program agencies, determine the number of members on the Advisory Committee and the duration of their terms, and appoint the Chairman and Members of the Advisory Committee. The Advisory Committee shall have balanced representation of State and local governments, the design professions, the research community, business and industry, and the general public. The Advisory Committee shall meet at the call of the Chairman, but in no event less often than every 6 months. The Advisory Committee shall submit a written report directly to the Congress, without review by the Office of Management and Budget or any other agency, by January 31 of each calendar year beginning after the date of enactment of the National Earthquake Hazards Reduction Program Reauthorization Act, which shall describe any recommendations the Advisory Committee has made to the Program agencies during the preceding year. Members of the Advisory Committee shall serve without compensation but may receive reimbursement for expenses. All expenses of the Advisory Committee shall be borne by the Agency. The Advisory Committee shall expire September 30, 1993.

SEC. 8. SEISMIC STANDARDS.

(a) BUILDINGS.—

(1) ADOPTION OF STANDARDS.—*The President shall adopt, not later than June 1, 1994, standards for assessing and enhancing*

the seismic safety of existing buildings constructed for or leased by the Federal Government which were designed and constructed without adequate seismic design and construction standards. Such standards shall be developed by the Interagency Committee on Seismic Safety in Construction, whose chairman is the Director of the National Institute of Standards and Technology or his designee, and which shall work in consultation with appropriate private sector organizations.

(2) **REPORT TO CONGRESS.**—The President shall report to the Congress, not later than June 1, 1994, on how the standards adopted under paragraph (1) could be applied with respect to buildings—

(A) for which Federal financial assistance has been obtained through grants, loans, financing guarantees, or loan or mortgage insurance programs; or

(B) the structural safety of which is regulated by a Federal agency.

(3) **REGULATIONS.**—The President shall ensure the issuance, before February 1, 1993, by all Federal agencies of final regulations required by section 4(b) of Executive Order numbered 12699, issued January 5, 1990.

(b) **LIFELINES.**—The Director of the National Institute of Standards and Technology shall submit to the Congress, not later than June 30, 1992, a plan, including precise timetables and budget estimates, for developing and adopting, in consultation with appropriate private sector organizations, design and construction standards for lifelines. The plan shall include recommendations of ways Federal regulatory authority could be used to expedite the implementation of such standards.

SEC. 9. ACCEPTANCE OF GIFTS.

(a) **AUTHORITY.**—In furtherance of the purposes of this Act, the Director of the Agency may accept and use bequests, gifts, or donations of services, money, or property, notwithstanding section 3679 of the Revised Statutes (31 U.S.C. 1342).

(b) **CRITERIA.**—The Director of the Agency shall establish by regulation criteria for determining whether to accept bequests, gifts, or donations of services, money, or property. Such criteria shall take into consideration whether the acceptance of the bequest, gift, or donation would reflect unfavorably on the Director's ability to carry out his responsibilities in a fair and objective manner, or would compromise the integrity of, or the appearance of the integrity of, the Program or any official involved in administering the Program.

SEC. 10. NON-FEDERAL COST SHARING FOR SUPPLEMENTAL FUNDS.

A grant under this Act to a State from the Agency that is made with funds appropriated under the Joint Resolution entitled "Joint Resolution making further continuing appropriations from the fiscal year 1990, and for other purposes", approved October 26, 1989 (Public Law 101-130; 103 Stat. 775), shall not include a requirement for cost sharing in an amount greater than 25 percent of the cost of the project for which the grant is made, and any cost sharing requirement may be satisfied through in-kind contributions.

SEC. 11. EARTHQUAKE INVESTIGATIONS.

(a) *ESTABLISHMENT OF INVESTIGATIONS PROGRAM.*—In addition to the other activities of the National Earthquake Hazards Reduction Program, there is established within the United States Geological Survey an earthquake investigations program, the purpose of which is to investigate major earthquakes, including their geologic characteristics and the behavior of buildings and other structures, so as to learn lessons which can be applied to reduce the loss of lives and property in future earthquakes. Such program shall be undertaken by the Director of the Survey in conjunction with the Director of the Agency, and any reports of such investigations shall be in compliance with the reporting requirements of the Program. The Director of the Survey is authorized to utilize earthquake expertise from the Agency, the National Science Foundation, the National Institute of Standards and Technology, other Federal agencies, and private contractors, on a reimbursable basis, in the conduct of such earthquake investigations.

(b) *FOCUS OF INVESTIGATIONS.*—Each such earthquake investigation shall analyze—

(1) the causes of the earthquake and the nature of the resulting ground motion;

(2) the behavior of structures and facilities of all kinds (including utility lines and equipment, both those that were damaged and those that were undamaged; and

(3) the effectiveness of pre-earthquake engineering and earthquake hazards mitigation programs and actions.

(c) *OTHER AREAS OF EMPHASIS.*—Each such earthquake investigation shall draw any appropriate lessons which will help—

(1) improve methods for determining the seismic risks existing at specific sites;

(2) determine the degree and nature of the hazards posed by different kinds of structures and facilities;

(3) develop engineering and construction approaches to improve the earthquake resistance of both new and existing structures and facilities; and

(4) improve earthquake hazards mitigation generally throughout the United States.

SEC. [7] 12. AUTHORIZATION OF APPROPRIATIONS.

(a) *GENERAL.*—(1) * * *

(2) through (6) * * *

(7) There are authorized to be appropriated to the Director, to carry out [the provisions of sections 5 and 6 of] this Act \$5,778,000 for the fiscal year ending September 30, 1988, \$5,788,000 for the fiscal year ending September 30, 1989, [and \$5,798,000] \$8,798,000 for the fiscal year ending September 30, 1990, \$14,750,000 for the fiscal year ending September 30, 1991, and \$17,000,000 for the fiscal year ending September 30, 1992.

(b) *GEOLOGICAL SURVEY.*—There are authorized to be appropriated to the Secretary of the Interior for purposes of carrying out, through the Director of the United States Geological Survey, the responsibilities that may be assigned to the Director under this Act not to exceed \$27,500,000 for the fiscal year ending September 30, 1978; not to exceed \$35,000,000 for the fiscal year ending September

30, 1979; not to exceed \$40,000,000 for the fiscal year ending September 30, 1980; \$32,484,000 for the fiscal year ending September 30, 1981; \$34,425,000 for the fiscal year ending September 30, 1982; \$31,843,000 for the fiscal year ending September 30, 1983; \$35,524,000 for the fiscal year ending September 30, 1984; \$37,300,200 for the fiscal year ending September 30, 1985; \$35,578,000 for the fiscal year ending September 30, 1986; \$37,179,000 for the fiscal year ending September 30, 1987; \$38,540,000 for the fiscal year ending September 30, 1988; \$41,819,000 for the fiscal year ending September 30, 1989; [and \$43,283,000] \$55,283,000 for the fiscal year ending September 30, 1990, of which \$8,000,000 shall be for earthquake investigations under section 11; \$50,000,000 for the fiscal year ending September 30, 1991, and \$55,000,000 for the fiscal year ending September 30, 1992.

(c) NATIONAL SCIENCE FOUNDATION.—To enable the Foundation to carry out responsibilities that may be assigned to it under this Act, there are authorized to be appropriated to the Foundation not to exceed \$27,500,000 for the fiscal year ending September 30, 1978; not to exceed \$35,000,000 for the fiscal year ending September 30, 1979; not to exceed \$40,000,000 for the fiscal year ending September 30, 1980; \$26,600,000 for the fiscal year ending September 30, 1981; \$27,150,000 for the fiscal year ending September 30, 1982; \$25,000,000 for the fiscal year ending September 30, 1983; \$25,800,000 for the fiscal year ending September 30, 1984; \$28,665,000 for the fiscal year ending September 30, 1985; \$27,760,000 for the fiscal year ending September 30, 1986; \$29,009,000 for the fiscal year ending September 30, 1987; \$28,235,000 for the fiscal year ending September 30, 1988; \$31,634,000 for the fiscal year ending September 30, 1989; [and \$35,454,000] \$38,454,000 for the fiscal year ending September 30, 1990; \$37,000,000 for the fiscal year ending September 30, 1991; and \$44,250,000 for the fiscal year ending September 30, 1992.

(d) [NATIONAL BUREAU OF STANDARDS] NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—To enable the Bureau to carry out responsibilities that may be assigned to it under this Act, there are authorized to be appropriated \$425,000 for the fiscal year ending September 30, 1981; \$425,000 for the fiscal year ending September 30, 1982; \$475,000 for the fiscal year ending September 30, 1983; \$475,000 for the fiscal year ending September 30, 1984; \$498,750 for the fiscal year ending September 30, 1985; \$499,000 for the fiscal year ending September 30, 1986; \$521,000 for the fiscal year ending September 30, 1987; \$525,000 for the fiscal year ending September 30, 1988; \$525,000 for the fiscal year ending September 30, 1989; [and \$525,000] \$2,525,000 for the fiscal year ending September 30, 1990; \$1,000,000 for the fiscal year ending September 30, 1991; and \$4,000,000 for the fiscal year ending September 30, 1992.

(e) * * *

(f) AVAILABILITY OF FUNDS.—Funds appropriated for fiscal years 1991 and 1992 pursuant to this section shall remain available until expended.